

Patent Application of

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For

AN IMPROVED VEHICLE SUSPENSION SYSTEM

Applicants claim benefits under 35 U.S.C 119(e) of  
Provisional Application No. 60/393946 filed 07/08/02.

## BACKGROUND OF THE INVENTION

### 1) Field of the Invention

**[0001]** This invention relates generally to the suspension mechanisms of multi-wheeled vehicles such as automotive and all terrain vehicle applications. Additionally it can also be used on snowmobile, watercraft, aircraft and motorcycle applications. Specifically, this invention, when inserted into a Heim Joint as compared to a conventional ball joint permits greater travel in the system while dramatically increasing strength and reducing both weight and replacement cost. Because various tapers are available for specific applications, no modification is required to the spindle or knuckle to which it is attached, unlike other like devices.

### 2) Description of the Prior Art

**[0002]** U.S. Patent Numbers 5,967,580, 5,845,540, and 4,911,033 describe variants of robotic manipulators that incorporated connected joints. U.S. Patent Number 4,783,095 shows a suspension system having independent movements of motion. U.S. Patent Number 4,986,688 shows a ball and socket joint for a vehicle steering system.

**[0003]** Applicants hereby incorporate herein by reference any and all U.S. patents, patent applications, and other documents and printed matter cited or referred to in this application.

## SUMMARY OF THE INVENTION

**[0004]** The connected joints of the prior art comprise a plurality of articulated joints henceforth individually referred to as a ball joint. Dimensionally, the Hime Joint is similar in size to a conventional ball joint or tie rod end found in selected vehicle suspension systems. While it does offer the rotational capability of the ball joint, it lacks the connecting insert to allow it to act as a ball joint or tie rod end. The newly invented tapered insert provides that added capability.

**[0005]** When the conventional upper and lower ball joints or tie rod ends are replaced with the Heim Joint and the newly invented tapered insert is installed, new and unexpected results occur. The Heim Joint, when fitted with the newly invented tapered insert provides proportionally greater vertical and or horizontal travel. This extra travel results in a dramatically improved suspension system; one that is up to eighty percent stronger and weighs less than the conventional ball joint system. Additionally the unsprung weight of the suspension system is reduced and handling is vastly improved. Friction is also greatly reduced compared to the conventional style ball joint.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Fig. 1 shows an exploded view of the presently preferred embodiment including a securing bolt 1, an upper tapered insert 3, an annular shaped socket 5, a freely movable ball 7, a lower tapered threaded insert 9, a washer 11, and a securing nut 13.

[0007] Fig 2. shows an exploded view of an alternate embodiment including a securing bolt 15, an upper tapered insert 3, an annular shaped socket 5, a freely movable ball 7, a lower tapered insert 17, a washer 11, and a securing nut 13.

#### DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENT

[0008] The Heim Joint comprises an annular shaped socket. The socket encases a freely movable ball shaped member with an included opening in the center. The presently preferred embodiment is a two piece (upper and lower) tapered insert which is mounted and secured within the included opening of the freely movable ball shaped member of the Hime Joint. This embodiment is attached to the ball shaped member by either a bolt securing the upper and lower portions together (see Fig. 1) or a bolt passed entirely through the embodiment which is secured by a nut on the bottom (see Fig. 2). The presently preferred embodiment is the stronger and more preferable of the two although both achieve the same end result.

[0009] The normal vehicle suspension system comprises an upper and lower suspension arm, an upper and lower ball joint and a steering knuckle. Additionally it includes tie rods to which tie rod ends are attached. These tie rod ends are attached to a steering stem or steering box which enables the vehicle to be steered. The new embodiment is and/or can be used at the end of the upper and lower suspension arms where attached to the spindle and at the ends of the tie rods where attached to the steering stem or box and the steering knuckle.

[0010] The vehicle suspension system improvement is comprised of the following

steps:

Detaching the spindle or knuckle from the upper and lower ball joints

Detaching the upper and lower ball joints from the upper and lower suspension arms.

Installing the new embodiment into the Heim Joint and then installing the assembled unit into the location previously occupied by the ball joint which was attached to the upper and lower suspension arm. Next the tapered lower portion of the embodiment must be installed into the upper and lower tapered included openings of the spindle or knuckle and then secured by properly installing the top portion of the same unit which holds the bottom portion in place.

[0011] So installed, the greater rotational capability of the Heim Joint when combined with the new embodiment will achieve greater vertical and horizontal travel with respect to the pivot points of the upper and lower suspension arms. Additionally it will have greater strength, reduced weight, create less friction and have a lower replacement cost than the items described in the above Description of the Prior Art. Used properly it will dramatically improve the on and off-road handling capabilities of the vehicle and vehicle suspension system to which it is attached.

[0012] Although the description above contains many specifications, these should not be construed as limiting the scope of the invention, but as merely providing illustrations of some of the presently preferred embodiments of the invention.